Name.		Onset and course.	Joint changes.	Bone changes shown by x-ray.
INFLAMMATORY OR INFECTIOUS JOINT DISEASES.				
Synovial forms.	Infectious arthritis mild type. Infectious arthritis; septic type. Infectious arthritis; Still's type. Gonorrhœal arthritis. Typhoid arthritis. Pneumococcus arthritis. Infectious villus arthritis, Schüller.	Acute to subacute attacks with temperature recurrent or intermittent. Comes on in the course of an infectious disease as in gonorrhœa, etc. Joint condition may be permanent but no new joints are involved after the attacks cease.	Effusive thickening of the soft parts; finally atrophy of the joint appendages.	No bone changes.
Osseous forms.	Infectious osteoarthritis; septic type. Typhoid osteoarthritis. Pneumococcus osteoarthritis. Gonorrhœal osteoarthritis.		Ankylosis.	Bony ankylosis and pseudohypertrophic processes, spurs, etc.
TROPHIC JOINT DISEASES.				
Synovial forms.	Metabolic arthritis. Arteriosclerotic arthritis. Toxemic arthritis.	Come on insidiously without temperature. Gradually progressive, new joints affected from time to time.	Effusive thickening of the soft parts. Ultimately atrophy of joint appendages.	No bone changes.
Osseous forms.	Metabolic osteoarthritis. Senile osteoarthritis. Neurotic osteoarthritis. Toxemic osteoarthritis.		Atrophy of joint structures.	In metabolic osteoarthritis rarefication and absorption of the articular ends of the bones; in the others rarefication plus pseudohypertrophic processes. There is never ankylosis in any of the trophic osteoarthritides.

EXOPHTHALMOS IN LEUKEMIA.[1]

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THE following case is worthy of record, not only because of the rarity of exophthalmos in leukemia, but because it will serve as a means of calling attention to the whole subject of lymphoid tumors in and around the eye, a subject not limited in its interest to the oculist, but concerning the general physician as well. I am indebted to Doctor N. Senn for the privilege of seeing the patient and reporting the case, as well as to Doctor C. Volini, under whose care the patient had been at one time, for many of the facts of the earlier history. Omitting non-essentials, the history is as follows:

P. B. was an Italian laborer, twenty-two years of age, of good habits and without discoverable hereditary or acquired taint of venereal or other diseases, who had done hard work as a laborer on the railroad until December 5, 1904. On that date he had a "cold in the head," with some fever, buzzing in the ears, pains and aches over the body, and a feeling of general weakness. A few days later a swelling of the eyelids and a prominence of the eyeballs were noted. Just before Christmas, Doctor Volini saw him and found him pale, with slight fever, enlarged spleen, and distinct exophthalmos. A blood count on December 22 showed 134,000 white blood corpuscles. Condensing the results of several examinations made after December 22, I may say that the case was a typical one of acute lymphatic leukemia. From the onset of symptoms of coryza to his death, January 10, 1905, was only thirty-six days. In that time there was a gradually increasing pallor with the attendant symptoms and findings of a grave anemia, dyspnœa, palpitation, dizziness, weakness, hemic cardiac murmurs, etc. The red blood corpuscles five days before death were 1,052,000; the hemoglobin by the Fleischl instrument was 20 to 22 per cent. The white corpuscles on several countings were always above 100,000 per cubic millimeter. The count of January 5 may be taken as fairly representing the others. Number of leukocytes per c.mm., 114,000; small mononuclear, 97.84 per cent., equal 111,500; large mononuclear, 0.6 per cent., equal 684; polymorphonuclear neutrophiles, 1.36 per cent., equal 1550; mononuclear neutrophiles (myelocytes), 0.16 per cent., equal 182; polymorphonuclear eosinophiles, 0.04 per cent., equal 45; number of leukocytes counted, 2500; number of normoblasts seen, 5.

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[1] Read at the meeting of the Association of American Physicians, Washington, D. C., May 15 and 16, 1906.

During the sixteen days he was under observation in the hospital he had a temperature that varied between 98° and 101°, with one rise to 103° F.

The spleen was palpable as a fairly firm, not especially tender mass extending a full hand's breadth below the left costal arch. The cervical, axillary, and inguinal glands were enlarged, some to the size of small hickory-nuts. There was tenderness on pressure over the sternum.

Death on January 10, 1905, was preceded by increasing dyspnœa, restlessness, and complaint of pain in the left side of the chest. A needle puncture of the ear made about this time bled for six hours, showing the hemorrhagic tendency so commonly seen in this form of leukemia, though it is noteworthy that there were no subcutaneous hemorrhages to be seen; at the autopsy, however, submucous, subserous, and visceral hemorrhages were found.

A striking feature was the early and persistent bilateral exophthalmos. There was a slight puffiness of the lids, but the prominence of the eyeball was so marked as immediately to attract attention. No other suggestions of Basedow's disease could be found, no enlarged thyroid, no tremor or cardiac irritability, though the pulse-rate was naturally accelerated (80 to 110) from the anemia and fever. The external ocular muscles worked perfectly, as did the iris. No tumor masses could be felt back in the orbit. There was little or no pain in the eye; vision was good. The retinal examination was negative, except for pallor. While suspecting chloroma an examination for thickening of the periosteum or for tumor masses other than the glands, especially in the temporal region was negative, nor could abnormal urinary pigment or pigmentation of the enlarged glands be made out.

Treatment consisted of strychnine, x-ray exposures every other day, and Fowler's solution in increasing doses.

The autopsy, made one hour after death by Doctor Peter Bassoe, showed: Hyperplasia of the spleen and lymph glands; enlargement of the intestinal lymph glands; lymphoid marrow in the femur; high grade of general anemia; multiple hemorrhages into the serous membranes, lymph glands, and viscera; leukemic infiltration of the lungs, kidneys, myocardium, and liver; diffuse bronchitis; atelectatic areas in the lungs; right serofibrinous pleuritis; localized fibrous adhesive pleuritis; double exophthalmos, with leukemic infiltration of the fatty tissue of both orbits.

Microscopically the findings were those commonly described as characteristic of acute lymphatic leukemia. Many organs, such as, the adrenals, kidneys, and testicles, showed the packing of vessels with lymphocytes with areas of localized lymphoid infiltration. The bones showed lymphoid transformation of the marrow. The retrobulbar orbital tissue showed general marked lymphocytic infiltration.

Exophthalmos in this case was produced by the collection of lymphoid cells in the orbit with resulting bulging of the globe of the eye. This has been reported in a few other cases of leukemia. Axenfeld,[1] in 1891, cited four cases of leukemia with orbital tumors and exophthalmos. In 1900, Hochheim[2] found eight cases that seemed to him beyond question leukemic in which there were symmetrical tumor formations in the lids or orbits. In one of these cases, that of Chauvel, the diagnosis of leukemia is doubtful, as Axenfeld suggests. This leaves up to 1900 seven cases of bilateral orbital leukemic tumors with resulting exophthalmos. Several cases have since been reported so that this number must be considerably increased.

All these cases have been in leukemia of the lymphatic type, that is, with glandular enlargement and lymphemia. Quite a number of instances are recorded—Hochheim cites ten—in which similar symmetrical lymphoid masses have been found in the lids or orbit (almost all showed orbital masses), in which the clinical diagnosis has been pseudoleukemia. More careful blood examinations, particularly in the way of qualitative examination of the

[1] Graefe's Archiv. f. Ophthal., 1891, xxxvii, 102.

[2] Ibid. 1900, li, 347.

white corpuscles, might have resulted in placing some of these cases in the category of the lymphatic leukemias.

In what percentages of cases of lymphatic leukemia this exophthalmos occurs cannot be stated. I have seen about fifteen cases of lymphatic leukemia, eleven being of the acute type, but have never before seen exophthalmos, nor do I recall an instance in quite a number of cases of Hodgkin's disease. The condition is apparently bilateral in a large proportion of cases.

Several interesting questions come up in connection with orbital tumors in leukemia. Do they tend to prove any relationship between Hodgkin's disease and lymphatic leukemia? Does their occurrence point toward the kinship of chloroma and leukemia? Can Mikulicz's disease—symmetrical enlargement of the salivary and lacrymal glands—be in any way connected with them? What is the origin of the lymphoid masses in the orbit? Are they deposited directly from the blood or developed from pre-existing lymphoid tissue of the orbit?

Without going into the question of the nature of Hodgkin's disease, but assuming that there exists a generalized glandular enlargement that is not tuberculous and to which the name Hodgkin's disease may be applied, we may say that one of the main grounds for differentiation between chronic lymphatic leukemia and Hodgkin's disease or pseudoleukemia has been by the blood examination. Often in cases classed as Hodgkin's disease a qualitative change in the blood in the direction of a lymphocytosis can be made out; and cases of Hodgkin's disease with a sudden transformation of the blood picture to one of lymphatic leukemia are not unknown. The relationship, therefore, is apparently close. The occasional occurrence in either disease of lymphoid masses in the orbits, often in both orbits, with resulting exophthalmos, and with the histological pictures very similar, adds another bit of testimony in favor of the view that the two diseases, if not in reality identical, are at least very closely related.

Chloroma, also, closely resembles in many respects lymphatic leukemia. Distinguishing marks have been the greenish color of the masses, the tendency to periosteal involvement, and especially the formation of masses in the temporal region and the frequent occurrence of exophthalmos, often bilateral. This resemblance has not been unrecognized, and Dock,[1] in 1893, in a valuable and much-quoted paper, presented to this Association, and Dock and Warthin[2] in 1904 called attention to the possible close relationship of chloroma to leukemia, its general symptomatology, its blood picture, and the histological findings being strikingly alike. Orbital tumors in chloroma are common. Exophthalmos was seen thirteen times in Dock's seventeen cases in 1893 and was double in eleven. In eleven of eighteen cases reported since 1893 there was exophthalmos. It is present in 75 per cent. according to Rosenblath.[1] The origin of the pigment is obscure. May not the pigmentary peculiarities be in a measure accidental or non-essentials, as suggested by Meller.[2] May one not say that the occurrence of lymphoid masses in the orbit, usually bilateral, in both chloroma and lymphatic leukemia is more than accidental, that it points to the similar if not identical nature of the two conditions.

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[1] Chloroma and its Relations to Leukemia, Amer. Jour. Med. Sci., 1893, cvi.

[2] Chloroma with Leukemia, Trans. Assoc. Amer. Phys., 1904, xix.

The relation of these orbital tumors to the disease sometimes called by the name of Mikulicz should be considered. It will be remembered that Mikulicz[3] described a chronic swelling, usually bilateral and symmetrical, of the salivary and lacrymal glands, a disease *sui generis*. Now in some cases of leukemia lymphoid masses are found in the lacrymal or salivary glands, as well as in the orbit, and the question has been raised whether the leukemic masses in these situations and the somewhat similar masses in Mikulicz's disease are not very near of kin. Kümmel,[4] however, regards the diseases as entirely different, not alone in certain histological pecularities but in their very essence. Constitutional effects, altered blood findings, are lacking in Mikulicz's disease; nor do the tumor-like growths pass beyond the capsule of the gland. And Kümmel agrees with Mikulicz in believing that in this disease the noxa, probably microbic, enters through the excretory duct of the gland, Stenson's duct, and the origin is, in no sense, hematogenic. There is, therefore, only a superficial resemblance between leukemia and pseudoleukemia and the disease described by Mikulicz, though this resemblance is close enough to make one study a given case carefully before deciding as to its exact nature, and it has already led to some confusion in classification, cases counted by some as belonging to one group being claimed by others for the other, as for instance, the case of Delens.

While it is not the purpose of this paper to discuss the pathogenesis of these lymphoid orbital infiltrations, a word concerning this point may not be amiss. Meller,[5] who has recently gone into the question fully, sees three possible sources: the masses of lymphoid cells may come (1) directly from the vessels; (2) from isolated conjunctival follicles that may have invaded the orbit; (3) from previously existing lymphoid tissue in the orbit. He regards the second as the most likely, supporting this view by a histological study of his specimens. Arnold's finding of small masses of lymphoid tissue in the orbit would offer an easy explanation, but no general confirmation of the existence of such tissue has been forthcoming.

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[1] Ueber Chlorom und Leukemia, Deut. Archiv. f. klin. Med., 1902, lxxii.

[2] Die lymphomatösen Geschwulstbildungen in der Orbita und im Auge, von Graefe's Arch. f. Ophth., 1905, lxii.

[3] Beiträge zur Chirurgie, Festschr. f. Billroth, Stuttgart, 1892.

[4] Weitere Beiträge zur Lehre von der Symmetrischen Erkrankung der Thränen- und Mundspeicheldrüsen (Mikulicz), Mitt. aus d. Grenzg. d. Med. u. Chir., 1897, ii, 111.

[5] Loc. cit.

No definite conclusions can be drawn from a study of my specimens, but the striking regularity of the arrangement of the cells often in long rows and at times parallel to the nerve fibers speaks in favor of their origin from some pre-existing lymphatic structure.

Whatever may be the answers to these questions that I have asked in a purely suggestive way; whatever may be the pathogenesis of these orbital masses or the relation to each other of the several diseases just mentioned, the clinical fact of the occasional occurrence of exophthalmos in leukemia, pseudoleukemia, chloroma, and Mikulicz's disease should be kept in mind by both oculist and internist.

TYPHOID AND PARATYPHOID SPONDYLITIS, WITH BONY CHANGES IN THE VERTEBRÆ.[1]

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The usual features of typhoid spine are well recognized, and there is no intention to discuss them in detail in this paper, but the proof of definite bony changes in the vertebræ seems worthy of note, especially as in one of the instances here reported these followed infection with a paratyphoid bacillus.

Case I. *Typhoid fever in January followed by the symptoms of typhoid spine; a typhoid relapse in July; definite bony change in the spine; recovery.*

The patient was a white male, aged twenty-eight years, a lawyer, admitted to the Johns Hopkins Hospital on July 4, 1904, complaining of a stiff and painful spine. The family history was negative.

Previous History. He had always been very strong and athletic. He had the ordinary diseases of childhood: chicken-pox, measles, whooping-cough, and one attack of malarial fever some years before. There was no history of gonorrhœa or lues. He had used alcohol very moderately.

Present Illness. On January 2, 1904, he went to bed with an attack of typhoid fever of moderate severity. He was convalescent early in March, when one night he awakened suddenly with very severe pain in the back, and found that he had to lie flat and quiet in bed, as any attempt to rise caused acute pain in the lumbar region. Since then his spine has been stiff. He was able to get up in a chair

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[1] Read at the meeting of the Association of American Physicians, Washington, D. C., May 15 and 16, 1906